

Kanuti NWR Progress Report FY11
Trumpeter Swan Survey, Kanuti National Wildlife Refuge,
August - September 2010

Purpose: Census Kanuti NWR's Trumpeter Swan population
Location: Kanuti National Wildlife Refuge (NWR) and surrounding areas
Dates: August 30 – September 2, 2010
Participants: Mike Spindler, Erin Julianus
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Report Date: December 21, 2010

Summary:

Even though the U. S. Fish and Wildlife Service's Waterfowl Management Branch switched from a five-year Interior-wide aerial census of Trumpeter Swans (*Cygnus buccinator*) to a random sample survey in 2010, Kanuti Refuge maintained the same level of funding and effort to census the refuge as it has since 1990. All Trumpeter Swan habitat within the fourteen 1:63,360-scale USGS quadrangles (Bettles 1:250,000-scale sectional) that overlap the refuge boundary was surveyed during August 30 – September 2. The crew observed a total of 464 swans, including 359 adults and 105 young. Approximately one-third (40) of the 118 pairs observed had broods. Nearly all population parameters (e.g., number of observations, adults, young, etc.) were at all-time highs, including the number of pairs observed (the most stable index of the population year-to-year), which have increased by 293% since 1990, and 73% since 2005. As of yet, the swan population in the survey area does not appear to be resource-limited. Current swan species composition (i.e., Trumpeter versus Tundra [*C. columbianus*]) within this population is unknown.

Background:

Beginning in 1968, and every five years since 1975, the U. S. Fish and Wildlife Service (USFWS) has censused interior Alaska's summering Trumpeter Swan population. The survey has documented that the adult population has followed a positive logistic curve, from nearly 2000 individuals in 1968 to over 17,000 in 2005 (Conant et al. 2007). As the population has expanded north and west into the Interior, additional areas have been added to the surveyed area. While the survey targets Trumpeter Swans and their nesting habitat within interior Alaska, an unknown percentage (presumably low) of Tundra Swans does occur within the statewide study area, but they are not distinguished from Trumpeters during these surveys.

Trumpeter Swan habitat designated within nine 1:63,360 scale USGS quadrangles (quads) of the Bettles 1:250,000 sectional (aka "greater Kanuti NWR") was first surveyed during the 1985 statewide survey (data not included in this report). In 1990, an additional five quads were added to the survey area and the resulting 14 quads constituted the survey area through 2000. These quadrangles overlap most, if not all, available swan habitat within Kanuti NWR. In 2005, the Waterfowl Management Branch (WMB) of USFWS added another quad northwest of, but not overlapping the Refuge boundary, bringing the total to 15 quads surveyed within the Bettles

sectional. Surveys in this quad were discontinued in 2010 because of its distance from the refuge and the lack of swans observed there in 2005 (one family).

Throughout the survey's history, WMB has shared responsibility for most funding and some surveys of the Kanuti quads, including 3 of the 15 assigned quads in 2005. However, with the dramatic increase in Trumpeter Swan abundance and distribution statewide, WMB decided in 2010 that they could not afford a complete swan census in the Interior. Instead they surveyed a random sample of the historically surveyed quads, including only one (Bettles A-5) that overlapped Kanuti NWR. Refuge staff elected to fund and survey all 14 quads that overlap the Refuge because of the dramatic increase in swans there since 1990. Data presented in this report are of those collected on surveys of the 14 quads that were consistently covered from 1990–2010.

Study Area and Methods:

From 30 August – 2 September 2010, Refuge Manager/pilot Spindler and SCA intern/rear-seat observer Julianus surveyed all potential Trumpeter Swan habitat (King 1973, Conant et al. 2001) within the 14 Bettles quads that overlap Kanuti NWR (Bettles A-3 through A-6, B-3 through B-6, C-3 through C-6, and D-3 and D-4; Fig. 1). They used an Aviat Scout to fly generally north-south-bearing parallel tracks, 2.25 – 2.5 km apart, at 150-180 m above ground (Fig. 2). They circled all swan groups to record precise locations via the aircraft GPS, and to ensure they correctly determined the number in each group (single, pair, flock [≥ 3 adults together], brood) and the ages (adult or cygnet) of individuals observed. Julianus also noted all locations on her hand-held GPS and the composition of observations on paper datasheets.

Results:

Swan Observations

More adults, cygnets, and total swans (adults plus cygnets) were observed in the 14 surveyed quads in 2010 than ever before (Table 1a). Paired birds, which likely represent the best index of the breeding population's status among years, increased 293% since 1990, and 74% since 2005 (Table 1a; Fig. 3). Similarly, there has been exponential growth in total pairs over the past 5 surveys (Fig. 4). Pairs observed on individual quads, a subsample of the survey area, have also shown substantial increases over the past 20 years, with 3 of the more populated quads (B-4, C-3, C-4) exhibiting increases $\geq 450\%$ (Table 2, Fig. 5). The central part of the Refuge, south of the Koyukuk River and including the Kanuti River watershed (designated "Kanuti Flats" in the USGS topographic map), held the densest concentration of swans (Fig. 3).

We have no data on nests that failed or broods that were lost before the survey. However, cygnet production was greater than detected on any previous survey (Tables 1a and 1b). One-third of all swan pairs we observed were accompanying young; observed brood sizes ranged from 1 to 6.

Although we observed fewer flocks in 2010, the number of flocked birds equaled that of 2005, the year when we spotted the most on any prior survey (Tables 1a and 1b). Flock size was the

highest seen to date, mainly because one flock held 41 swans. The remaining fourteen flocks seen ranged from 3 to 11 swans and averaged only 5.9 swans per flock.

General Notes/Conditions

The observers covered the 14 quads over parts of 4 days and spent about 18.5–20 hr surveying. Estimated cost of the survey was about \$3,620 (\$123/hr for flight-time [20 hr], \$50/hr for avgas, \$20/person/d for food). Weather conditions were highly favorable, with winds 0–5 kt and no precipitation.

Discussion points

In June 1989, Wilk (1993) observed 16 pairs (59%) of Trumpeter and 11 (41%) pairs of Tundra swans nesting in a study area that was roughly the same as the greater Kanuti NWR area surveyed in 2010. This total number of swans seen was quite close to the 1990 “Kanuti” estimate (30) for swan pairs made during WMB’s statewide census. We do not currently know what proportion of the swans we observed in 2010 was Trumpeter or Tundra Swans. However, the nesting Trumpeter:Tundra swan ratio on nearby Koyukuk NWR (within the same “Koyukuk” stratum as Kanuti NWR) changed and became greatly skewed toward Trumpeter Swans between 1985 and 2004 (Bryant et al. 2005). Therefore, it is probable that the dramatic increase in swans on Kanuti NWR is also attributable to an increase in Trumpeter Swans, possibly at the expense of Tundra Swans. Quantifying the relative nesting abundance and distribution of the two species of swans on the greater Kanuti NWR study area is of interest a) to the Refuge in meeting our long-term monitoring objectives of both species and b) to WMB in ensuring that future surveys on their part are meeting their expressed objective of censusing primarily Trumpeter Swans.

To date, we do not know whether the swans pairs observed without broods during our late August census were breeding and/or resident (“Kanuti” vs. migrating). An effort should be made in May/June during “census” years (e.g., 2015) to determine the respective nesting composition of swans on the study area. These data would allow us to compare the number of swans that actually nest on the study area with the total pairs observed during the late summer census and so better evaluate the importance of the Refuge to breeding swans. Swan observations are recorded during the annual molting goose survey in late June/early July and might be of some use in distinguishing later (during the swan census) between territorial swan pairs and transient migrants. However, the coverage for the goose survey has been much reduced in recent years (e.g., from 101 to 25 aerial transects, targeting traditional molting “hotspots”) and thus represents a much reduced survey area than that flown during the swan census.

An exponential growth model agrees with the swan population data we have collected on Kanuti NWR over the past 20 years ($R^2 = 0.9723$). Nonetheless, we do not expect such growth to continue indefinitely. We do not know which local, or even non-local, conditions will result in slowing the growth of the population of swans that summer on and near the Refuge. However, at some point, the population will become resource-limited (e.g., all adequately sized lakes occupied) and the population will reach some carrying capacity. It may be informative to determine if there is a relationship between the size of lakes and occupancy by breeding swans by species. Lake size may be a limiting factor and thus may be useful as a predictor of swan presence. Given the present exponential growth in the local swan population (including a

widening distribution) and the relative infrequency of the survey, the refuge should aspire to maintain the same level of effort at least until the local population abundance and distribution stabilize.

Literature Cited:

- Bryant, J. M., B. D. Scotton, and M. R. Hans. 2005. Sympatric Nesting Range of Trumpeter and Tundra Swans on the Koyukuk National Wildlife Refuge in Northwest Interior Alaska. Unpublished USFWS Report. Koyukuk/Nowitna National Wildlife Refuge Complex, Galena, Alaska.
- Conant, B., J. I. Hodges, D. J. Groves., and J. G. King. 2007. Alaska Trumpeter Swan Status Report 2005. Unpublished USFWS Report, Waterfowl Management, Juneau, Alaska.
- King, J.G. 1973. The use of small airplanes to gather swan data in Alaska. *Wildfowl* 24:15-20
- Wilk, R. J. 1993. Observations on sympatric tundra, *Cygnus columbianus*, and trumpeter swans, *C. buccinator*, in north-central Alaska, 1989-1991. *Can. Field-Nat.* 107(1): 64-68.

Table 1a. Comparison of summering swans observed on 14 quads within the Bettles sectional (aka “greater Kanuti NWR”), 1990–2010.

Year	Total Observations	Single Adults	Paired Adults	Flocked Adults	Total Adults	Total Young	Total Swans
1990	41	5	60	3	68	26	94
1995	57	8	74	57	139	34	173
2000	69	6	112	27	145	23	168
2005	94	7	136	109	252	73	325
2010	145	14	236	109	359	105	464

Note: Does not include data from 1985 because only nine quads were surveyed at that time. Also does not include the lone observation from Bettles D-6 in 2005 (1 adult pair with brood of 3 cygnets).

Table 1b. Comparison of summering swans observed on 14 quads within the Bettles sectional (aka “greater Kanuti NWR”), 1990–2010 (continued).

Year	Total Pairs	Total Flocks	Total Broods	Brood Size¹	Flock Size	% Broods Per Pair
1990	30	1	8	3.3	3.0	26.7%
1995	37	11	13	2.6	5.2	35.1%
2000	56	6	10	2.3	4.5	17.9%
2005	68	19	22	3.3	5.7	32.4%
2010	118	15	40	2.6	7.3	33.9%

Note: Does not include data from 1985 because only nine quads were surveyed at that time. Also does not include the lone observation from Bettles D-6 in 2005 (1 adult pair with brood of 3 cygnets).

¹ Number of cygnets per successful brood (does not include failed nests or broods)

Table 2. Annual totals, including overall percent increase, for summering **swan pairs** on 14 quads within the Bettles sectional (aka “greater Kanuti NWR”), August – September, 1990–2010. [Percent increase calculated from first non-zero year through 2010.]

Year	1990	1995	2000	2005	2010	% Increase Through 2010
Bettles A-3	1	2	3	3	4	+300
Bettles A-4	5	7	9	14	17	+240
Bettles A-5	4	5	8	12	15	+275
Bettles A-6	2	3	9	3	5	+150
Bettles B-3	0	1	2	1	2	+100
Bettles B-4	3	6	6	14	18	+500
Bettles B-5	10	7	7	10	23	+130
Bettles B-6	0	0	0	1	0	0
Bettles C-3	2	1	3	4	11	+450
Bettles C-4	2	2	5	2	14	+600
Bettles C-5	0	0	1	1	4	+300
Bettles C-6	0	1	1	0	2	+100
Bettles D-3	1	1	1	1	2	+100
Bettles D-4	0	1	1	2	1	0

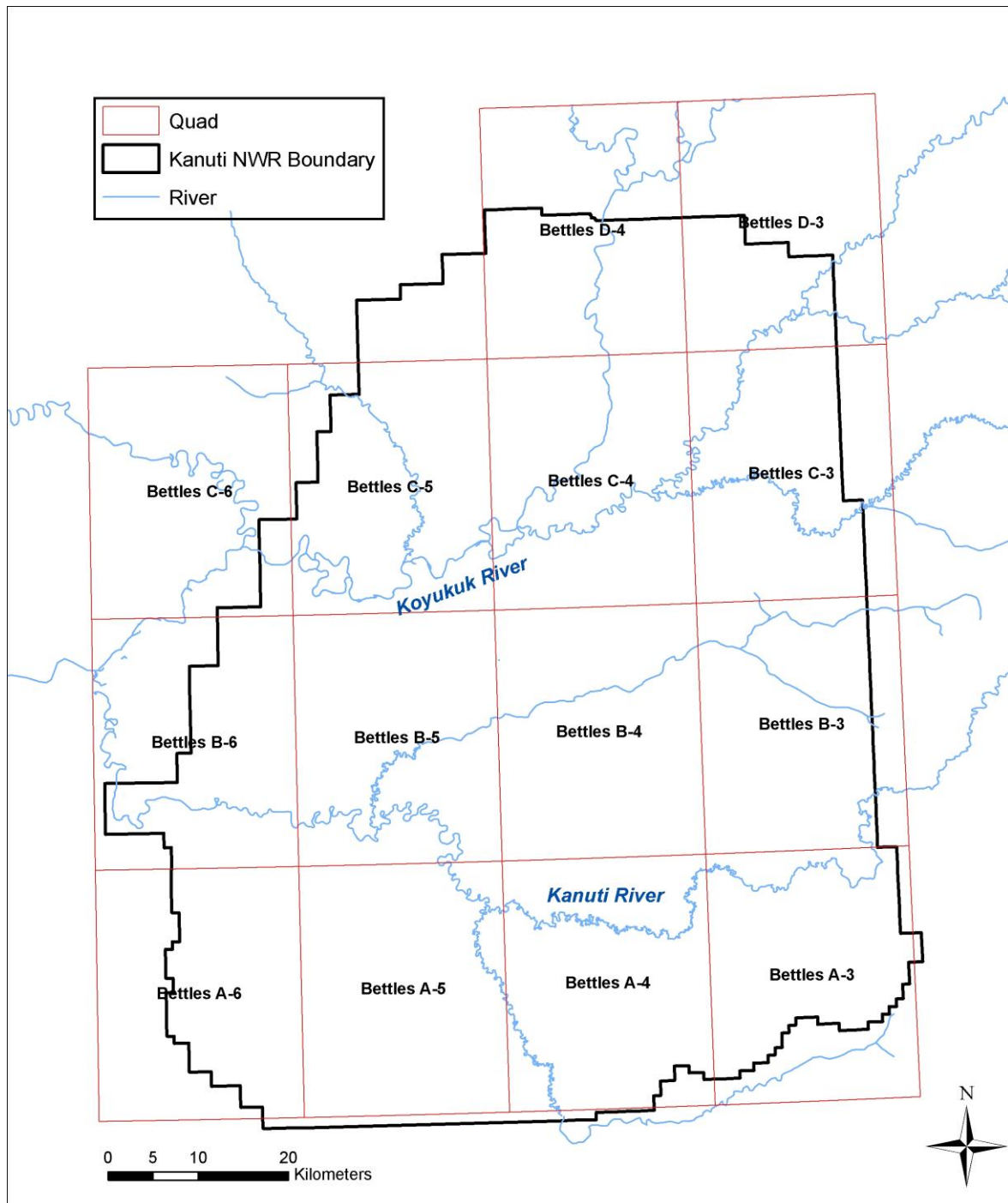


Figure 1. Depiction of 14 1:63,360 scale USGS quadrangles (Bettles 1:250,000 scale sectional) surveyed for swans near Kanuti NWR, summer 2010.

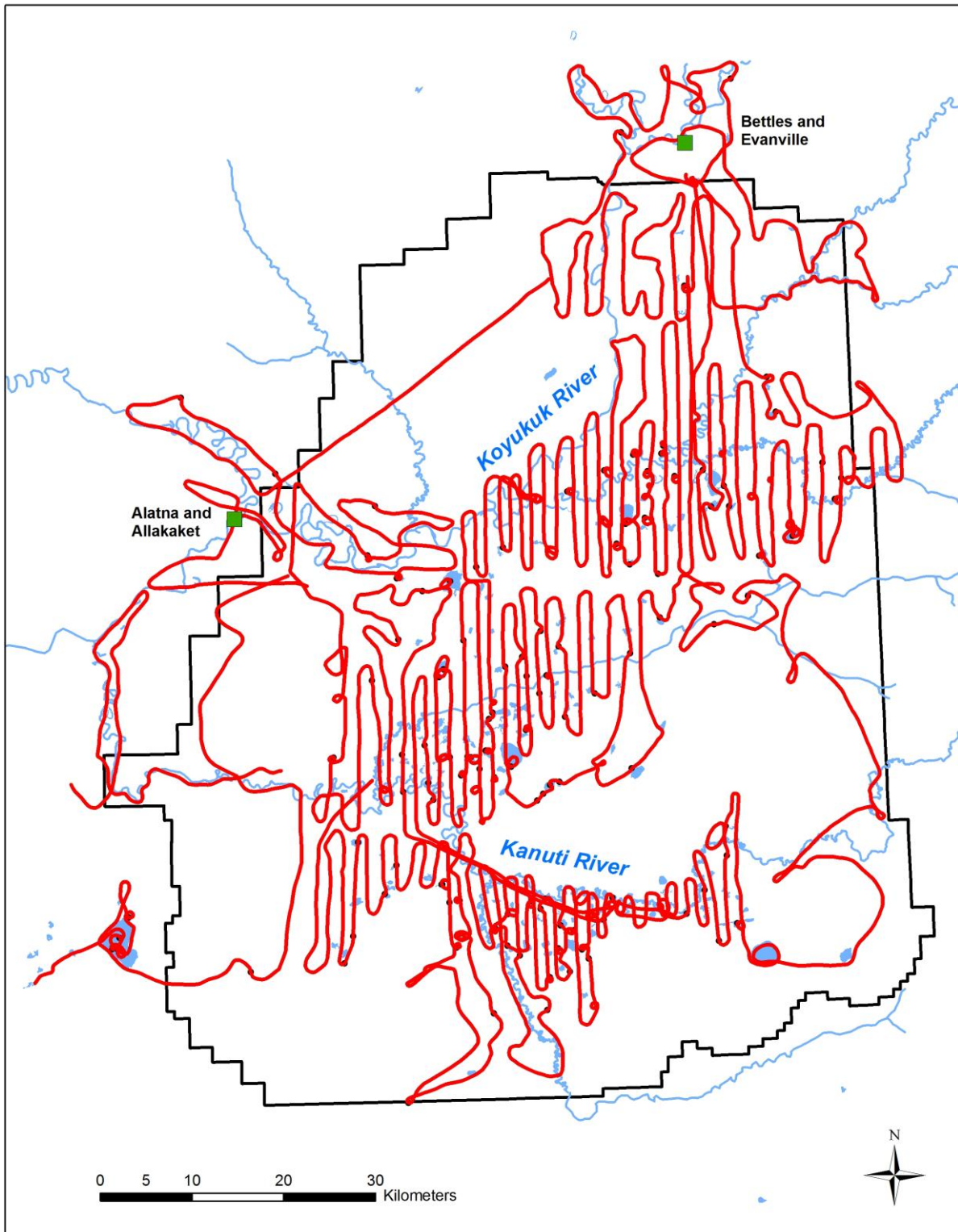


Figure 2. Depiction of flight lines (red) flown over swan habitat within and near Kanuti NWR, summer 2010.

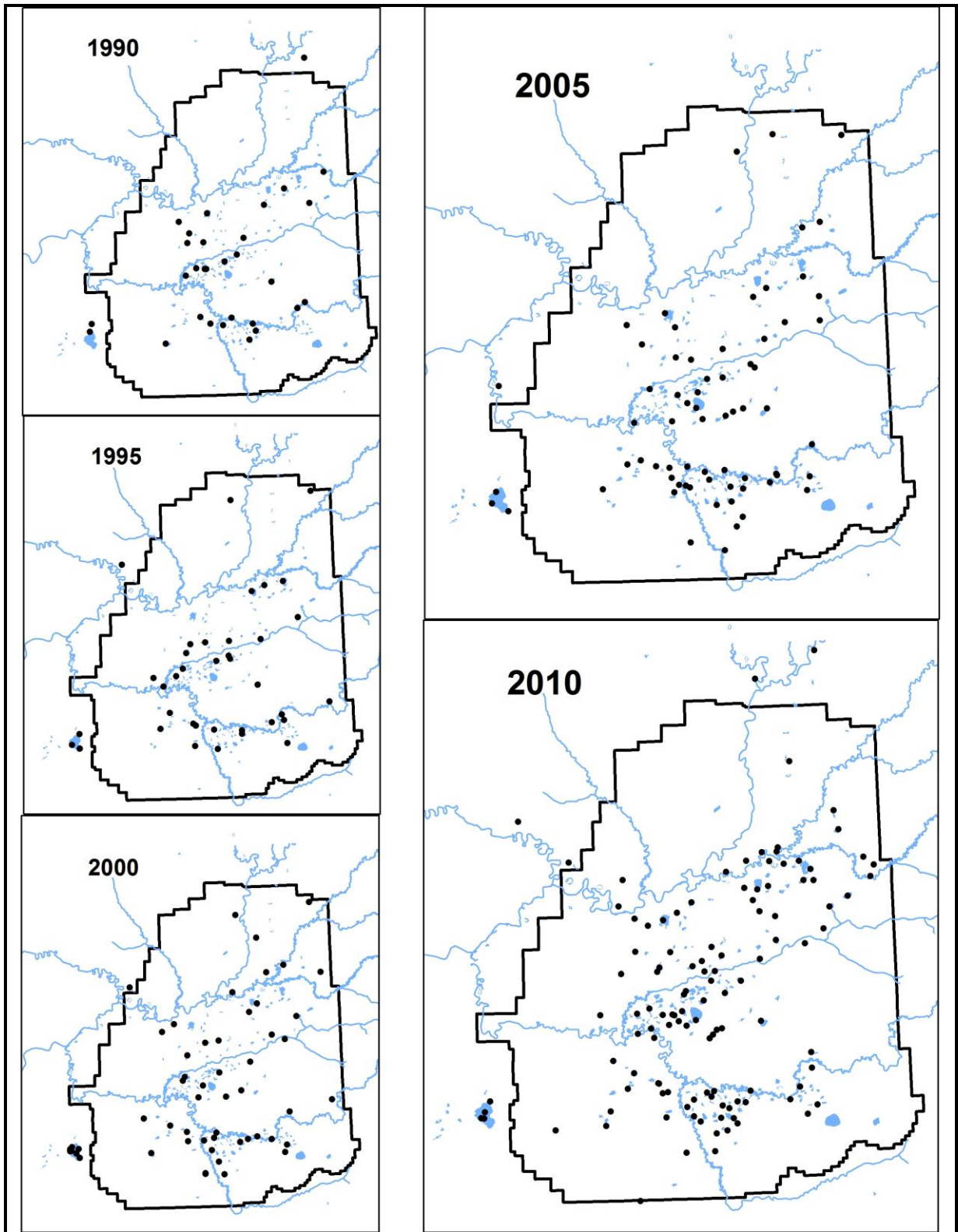


Figure 3. Illustration of increase in **swan pairs** found on 14 quads within the Bettles sectional over 20-year period, 1990 – 2010. Kanuti NWR boundary and major rivers and lakes shown for reference.

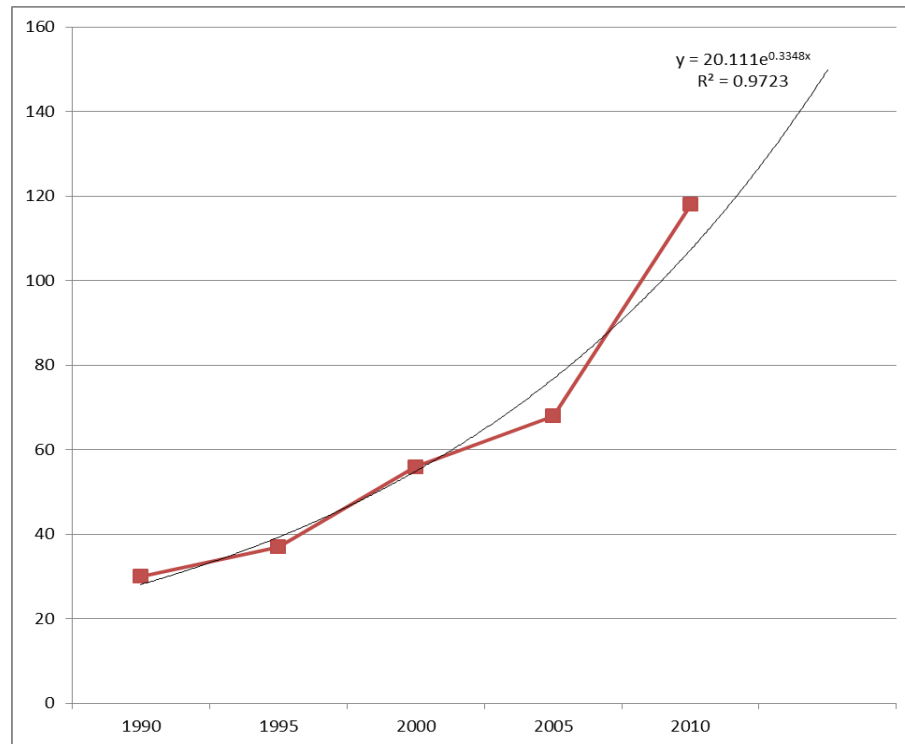


Figure 4. Exponential growth model (gray line) fitted to total swan pairs (vertical axis) vs. year for 14 quads censused within the Bettles sectional over 20-year period, 1990–2010.

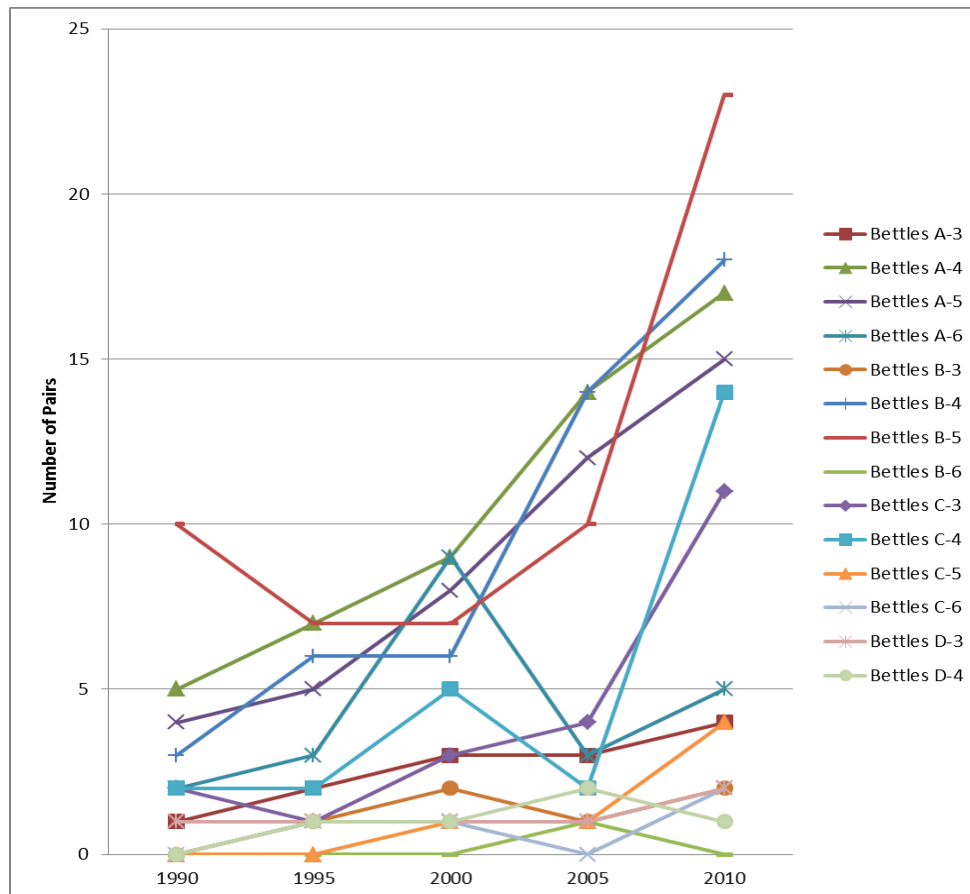


Figure 5. Increase in swan pairs for 14 quads censused within the Bettles sectional over 20-year period, 1990–2010.